CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Tech(CSE) **Session: 2021-22**
Semester: First **Max. Time: 3 Hours**
Course Title: Advanced Databases **Max. Marks: 70**
Course Code: MT CS 101

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q1			(4X3.5=14)
	A	With an example Justify the statement "Multivalued dependencies are consequences of 1NF". Also discuss how multivalued dependencies are eliminated with example.	
	B	Differentiate Forward recovery and Backward recovery	
	C	Differentiate between OLAP and OLTP.	
	D	Explain ODL and OQL with suitable examples.	
	E	Differentiate Immediate Update and Deferred Update	
	F	Compare and contrast 2PC and 3PC protocol.	
	G	Discuss the significance of indexing in databases.	
Q2			(2X7=14)
	A	What is normalization and why is it done? Explain various normal forms with example of each.	
	B	What is serializable schedule? Give an example of conflict serializable and view serializable schedule.	
	C	Explain the operation of two-tier client/server architecture for RDBMS. Give its various applications.	
Q3			(2X7=14)
	A	How does the concept of an Object in Object Oriented model differ from the concept of an ER model? Explain with an example.	
	B	Draw and discuss the architecture of distributed databases. Also explain its significance in real life applications.	
	C	What are the various key elements in parallel database processing? Explain with example.	
Q4			(2X7=14)
	A	i) Compare and contrast structured, semi-structured and unstructured data. ii) What are the benefits of XML over HTML? Give a suitable example of XML.	
	B	What is checkpoint? Discuss its significance in backup and recovery techniques.	
	C	How the recovery control is managed in distributed systems? Discuss with example.	
Q5			(2X7=14)
	A	What is knowledge discovery? Explain association rule mining with example.	
	B	What are data marts? How does it help in maintaining a database?	
	C	Discuss the use case of multimedia databases.	

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Tech(CSE) **Session: 2021-22**

Semester: Ist Semester **Max. Time: 3 Hours**

Course Title: Software Testing & Quality Management **Max. Marks: 70**

Course Code: MT CS 107

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is Exploratory Style of software development?

b) List the difference between QA & QC?

c) What is McCabe's cyclomatic complexity metric? Explain its significance.

d) What are the activities carried out under feasibility study?

e) Write short note on V & V model.

f) What is the difference between Unit Testing and Integration Testing?

g) What is SDLC model? Why it is important for S/W development.

Q 2. (2X7=14)

a) What is the advantage of Iterative Waterfall Model over Classical Waterfall model? Explain.

b) What is Software Requirement Specification Document? Explain its format in detail.

c) Difference between Agile model vs. RAD model.

Q3. (2X7=14)

a) What is Total Quality Management (TQM) ? Explain its key principles in detail.

b) Write a note on six sigma approach.

c) List the activities carried out under RMMM with a block diagram?

Q 4. (2X7=14)

a) What is Black Box Testing? Explain its types.

b) What is system Testing and explain its types.

c) Explain the followings:- i)Path Testing ii) User acceptance testing

Q 5. (2X7=14)

a) Evaluate the importance of Test Plan Development.

b) How to perform the client/server testing? Explain.

c) Draw a use case diagram of an Online Shopping System and explain its components.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme:	**M.Tech (CSE)**	**Session: 2021-22**
Semester	**First**	**Max. Time: 3 Hours**
Course Title:	**Big Data Analytics**	**Max. Marks: 70**
Course Code:	**MT CS 108**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is the Big Data Analytics? Explain characteristics of Big Data.

b) Explain the types of Big data?

c) Difference between Stream processing and Batch Processing.

d) Describe the role of Zookeeper in Hadoop? List all of its functionality.

e) List the difference between Pig and Hive.

f) Write short note on : i) Sqoop ii) Stream Processing

g) Write short note on Hbase along with its block diagram.

Q 2. (2X7=14)

a) Explain HDFS architecture with a neat diagram.

b) Explain working of following phases of Map Reduce with one common example. (i) Map Phase (ii) Combiner Phase (iii) Shuffle and Sort Phase (iv) Reducer Phase

c) Explain Hadoop file system interface.

Q3. (2X7=14)

a) Write short note on : i)STORM ii) SPARK iii) FLINK

b) Write a Short note on Sampling in Data Streams? What are the applications of Data Stream?

c) Explain the Role of followings in Hadoop Architecture:
i) Task Tracker ii) Job Tracker iii) Name Node iv) Data Node

Q 4. (2X7=14)

a) Explain Hadoop Ecosystem in detail.

b) Explain YARN and Its major components with a diagram.

c) How does Hadoop handles failure? Explain job scheduling schemes in Hadoop.

Q 5. (2X7=14)

a) What is Pig Latin? Discuss the following operators with an example:
i) LOAD ii) DUMP iii) FILTER iv) ORDER BY v) DISTINCT

b) Explain the Apache Pig and Its components with a block diagram.

c) What is Hive QL? How it is different from SQL? Give example of quering data in Hive.

CENTRAL UNIVERSITY OF HARYANA

First Semester Examinations April 2022

Programme:	**M.Tech. CSE**	**Session: 2021-22**
Semester:	**First**	**Max. Time: 3 Hours**
Course Title:	**Advanced Computer Network**	**Max. Marks: 70**
Course Code:	**MT CS 102**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. Write a short note on: (4X3.5=14)

a) ATM

b) Key Distribution Protocol

c) Digital Certificate

d) RIP

e) BGP

f) CSMA/CA

g) QoS

Q 2. (2X7=14)

a) What is IP Addressing? Differentiate between IPV4 and IPV6.

b) Explain virtual Private Network.

c) What Support has for security? Describe in detail.

Q3. (2X7=14)

a) What are baseband and broadband transmission?

b) Explain any three line coding schemes.

c) Describe the challenges in transmission of digital signals.

Q 4. (2X7=14)

a) Explain briefly about Persistent and Non persistent CSMA Protocols

b) Explain SSL.

c) Explain the purpose of routing protocols. How do they work?

Q 5. (2X7=14)

a) Differentiate between TCP and UDP.

b) Explain the principle of Reliable data Transfer in TCP.

c) Illustrate the scenario for establishing a TCP connection using a three way Handshake Protocol.

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations August-September 2022

Programme: M.Tech. (CSE) **Session: 2021-22**

Semester: II **Max. Time: 3 Hours**

Course Title: Deep Learning **Max. Marks: 70**

Course Code: MT CS 210

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the limitations of Deep Learning techniques?

b) Explain the working of Perceptron with the help of drawn architecture?

c) What is the use of the loss function?

d) Briefly explain the working of Gated Recurrent Unit (GRU)?

e) What will happen if the Learning Rate is set too low or too high?

f) What is the meaning of dropout in Deep Learning?

g) What do you understand by the Bias and Variance tradeoff?

Q 2. (2X7=14)

a) What is Deep Learning? Discuss the issues in the Deep Learning framework?

b) What are the challenges associated with the training of Deep Neural networks? How to overcome these challenges?

c) Describe the evolution of Deep Learning? Why Deep Learning is said to be a powerful tool in the world of automation?

Q3. (2X7=14)

a) What is an Artificial Neural Network? Explain each component of Neural Network representation.

b) What is Gradient Descent? How is the concept of backpropagation related to Gradient descent?

c) What do you mean by Overfitting and Underfitting? How they can be minimized?

Q 4. (2X7=14)

a) What are the building blocks of CNNs? Explain each of them in detail.

b) What is Transfer learning? Give an example code to explain how transfer learning can be achieved.

c) What are Residual Networks? Explain the main idea that makes it different from CNN.

Q 5. (2X7=14)

a) What are the main components and architecture of Autoencoder? What are the types of autoencoders?

b) What is LSTM? What are the steps involved in the working of an LSTM network?

c) What are Generative Adversarial Networks (GAN)? Discuss the working of GAN and the role of its components?

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme:	M.Tech (Energy System and Management)	**Session: 2021-22**
Semester:	First	**Max. Time: 3 Hours**
Course Title:	Introduction to Renewable Energy Systems	**Max. Marks: 60**
Course Code:	**MTESM-101**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries six marks.

Q 1. (4X3 =12)

(a) What is the role of fill factor in PV cell?

(b) Write the name and capacity of major solar power plants in India.

(c) What is ocean thermal energy?

(d) Which point is considered for selection of site in Wind power plant?

(e) Explain the fuel cell and its types.

(f) How many types of Hybrid system are used?

(g) What is the Tidal energy?

Q 2. (2X6=12)

a) List the various non conventional energy resources. Give their availability, relative merits and demerits in Indian context.
b) Explain characteristics of solar PV cell.
c) Write short note on Indian Ministry of New and Renewable Energy (MNRE) department policies for promotion of Wind and Solar energy.

Q3. (2X6=12)

a) Explain Wind Energy Conversion System (WECS). What are the basic components?
b) Differentiate horizontal axis and vertical axis wind turbine with neat and clear diagram.
c) What is the origin of biomass energy? What is the present status of development of biomass energy resources in India?

Q 4. (2X6=12)

a) What are the limitations of Tidal energy?
b) Write applications of geothermal energy.
c) Explain advantages and disadvantages of geothermal energy over other forms of energy sources.

Q 5. (2X6=12)

a) Explain the working and types of super capacitors.
b) How are batteries recycled and why?
c) Which types of reactions take place in fuel cell? Explain.

Central University of Haryana
ODD Semester Term End Examination April 2022
M.Tech. Programme
Branch: Energy System and Management

Course Code: MTESM-103 **Sem.: Ist**

Course Title: Energy Storage Systems for Electric Vehicles **Max Marks: 60**

Instructions: Question no. 1 has seven parts and students need to answer any four. Each part carries three marks. **Question Numbers 2(two) to 5(five)** carry twelve marks each with internal choice.

PART –I

Q. No.1

(a) What is meant by solar green house?

(b) Discuss the concept of regenerative braking energy.

(c) Explain in brief the need for exploiting renewable energy sources.

(d) What are factors affecting the performance of batteries used in EVs?

(e) Discuss the history of hybrid electric vehicles.

(f) Compare conventional vehicle with Hybrid electric vehicle.

(g) Discuss the issues of energy management strategies.

PART –II

Q. No.2 Explain the electric-based transportation technologies and their impact on environment and energy supply.

OR

Q. No.2 State and explain the dynamic equation of vehicle motion.

Q. No.3 Draw different configurations of drive trains in electric vehicles. Briefly explain each configuration.

OR

Q. No 3 A DC separately excited motor is powered by a dc to dc converter from a 800 volts dc source. The armature resistance is 0.05 Ω. The back emf constant of the motor is 1.527 V/A rad/sec. The average armature current is 200 amps. The field current is 2.5 amps. The armature current is continuous and has negligible ripple. If the duty cycle of the converter is 60%, determine (a) the input power from the source, (b) the equivalent input resistance of the dc-dc converter drive, (c) the motor speed, and (d) the developed torque.

Q. No.4 Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams.

OR

Q. No.4 Elaborate energy management system and issues of energy management strategies of EHV.

Q. No.5 Explain the principles operation of an alkaline fuel cell with the aid of a diagram.

OR

Q. No.5 Draw the line diagram and explain the working of hydrogen fuel cell.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Tech **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Digital Signal Processing **Max. Marks: 70**

Course Code: MTESM-108

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Check the periodicity of the signal, $x(n) = \cos(n^2)$

b) Check the condition of stability with respect to the parameter 'a' of an LTI system with unit sample response $h(n) = a^n u(n)$, where u(n)= unit step signal

c) What is time-invariance property of a discrete-time system?

d) Find Z-transform of unit impulse signal.

e) What do you mean by power spectral density?

f) How a low pass digital filter can be converted into a low pass digital filter with different cut-off frequency?

g) What are fricative sounds of speech signal?

Q 2. (2X7=14)

a) For the given system,

$$y(n) = 3x(n-2) + 2x(n-1) + 5x(n) + 1.$$

Check stability, causality and linearity of the system.

b) Given $x_1(n) = \{2,1,0,1,2\}$ and $x_2(n) = \{5,3,2,1\}$, find the linear convolution of the two signals $x_1(n)*x_2(n)$ and verify the result using Z-transform.

c) A discrete-time system is characterized by a difference equation,

$$y[n] = x^2(n) - x(n-1).x(n+1);$$

where x(n) and y(n) denote the input and output respectively of the discrete-time system, check whether the system is linear? Is it time-invariant? Is it causal?

Q3. (2X7=14)

a) For the given difference equation,

$$y(n) + 2y(n-1) = x(n), \text{ where } y(-1)= 5 \text{ and } x(n) = 5u(n),$$

Find zero input response (ZIR) and zero state response (ZSR) of the system using Z-transform.

b) Find the Z-transform and region of convergence (ROC) of discrete-time (DT) signal,

$$x(n) = (1/2)^n u(n) - 2^n u(-n - 1).$$

c) Explain and draw butterfly diagram for Radix-2 decimation in time (DIT) FFT algorithm.

Q 4. (2X7=14)

a) Design a linear phase FIR band-pass filter to pass the frequencies in the range of 0.4π to 0.65π by taking 7 samples of Hanning window sequence.

b) Explain the IIR digital filter design based on a least squares approach.

c) Design a first-order digital low-pass filter with a 3-dB cutoff frequency of $\omega_c = 0.25\ \pi$ by applying the bilinear transformation to the analog Butterworth filter,

$$H_a(s) = 1/(1 + s/\Omega_c)$$

Q 5. (2X7=14)

a) What do you mean by sampling rate conversion? Explain the interpolation method to change the sampling frequency with respect to Multi-rate digital signal processing.

b) Explain Least-Mean-Square (LMS) Adaptation Algorithm with respect to adaptive filters.

c) Differentiate between voiced and unvoiced speech signal.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme:	M.Tech (Energy System and Management)	**Session: 2021-22**
Semester:	First	**Max. Time: 3 Hours**
Course Title:	ENERGY CONSERVATION AND MANAGEMENT	**Max. Marks: 60**
Course Code:	**MTESM-101**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries six marks.

Q 1. (4X3=12)

a) List steps involved in 'energy audit'.

b) Write down the steps involved in 'Energy management Strategy'?

c) Distinguish between 'preliminary energy audit' and 'detailed energy audit'?

d) Define 'energy management'.

e) What do you mean by energy audit?

f) Explain the role of energy manager.

g) Explain Voltage Sag and its effects

Q 2. (2X6=12)

a) What are the benefits for industry through implementing energy efficiency programme?

b) What are the features of energy conservation act? By whom the energy consumers should get the energy audits carried out as per the act?

c) Explain the Power Scenario of India in detail.

Q3. (2X6=12)

a) Discuss the various methods for power factor improvement.

b) A fluorescent tube light consumes 40 W for the tube and 10 W for choke. If the Lamp operates for 8 hours a day for 300 days in a year, calculate the total energy cost per annum if the energy cost is Rs.3/- per kWh.

c) What are the three modes of heat transfer? Explain with examples?

Q 4. (2X6=12)

a) What are the benefits of benchmarking energy consumption?

b) Explain Performance Assessment technique of Power Factor Capacitors.

c) What motivates industry to become more energy efficient?

Q 5. (2X6=12)

a) What are the precautions to be taken in the case of energy efficient motor applications?

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme:	M.Tech (Energy System and Management)	**Session: 2021-22**
Semester:	First	**Max. Time: 3 Hours**
Course Title:	ENERGY CONSERVATION AND MANAGEMENT	**Max. Marks: 70**
Course Code:	**MTESM-101**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) List steps involved in 'energy audit'.

b) Write down the steps involved in 'Energy management Strategy'?

c) Distinguish between 'preliminary energy audit' and 'detailed energy audit'?

d) Define 'energy management'.

e) What do you mean by energy audit?

f) Explain the role of energy manager.

g) Explain Voltage Sag and its effects

Q 2. (2X7=14)

a) What are the benefits for industry through implementing energy efficiency programme?

b) What are the features of energy conservation act? By whom the energy consumers should get the energy audits carried out as per the act?

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Q3. (2X7=14)

a) Discuss the various methods for power factor improvement.

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c) What are the three modes of heat transfer? Explain with examples?

Q 4. (2X7=14)

a) What are the benefits of benchmarking energy consumption?

b) Explain Performance Assessment technique of Power Factor Capacitors.

c) What motivates industry to become more energy efficient?

Q 5. (2X7=14)

a) What are the precautions to be taken in the case of energy efficient motor applications?

b) Explain Energy Efficiency policies for the Industrial Sector.

c) Explain the principle of automatic power factor controller.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme:	**M.Tech (CSE, CIVIL. Elec.)**	**Session: 2021-22**
Semester:	**First**	**Max. Time: 3 Hours**
Course Title:	**English for Research Paper Writing**	**Max. Marks: 70**
Course Code:	**Audit 1**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. Do as directed in the bracket. (4X3.5=14)

a) The result is that we as listeners or readers have certain expectations as to the order in which the words are going to appear if this order is not respected we may be thrown off the trail in much the same way foreign students when speaking tend to stress inappropriate words in a sentence highlighting words that for an english speaker would normally have no relevance the reason for this is that both english word order and English stress are strictly related to meaning in other languages this is not always the case the problem is of course that students tend to transfer their native word and stress into english.

[Insert punctuation (including capitalization) into the above text]

b) The software performs all the checks (price, quantity, quality). [Remove brackets in the above sentence and rewrite it]

c) Concerning the side effects of the treatment, only one serious effect is currently known about. Regarding the best way to learn a language, several theories have recently been developed. [Rewrite the sentences so that it begins with subject]

d) Briefly explain the careful use of 'former' and 'latter' in a research paper.

e) What are False Friends in a research paper?

f) What is Monologophobia? Discuss its harmful effects.

g) The results of the survey, once they have been processed, will be used to make a full assessment of the advantages of such an approach. Let us take into consideration, using the data given in Table 1, the most important parameters. (remove the commas and make each meaningful sentence)

Q 2. Attempt any two of the following: (2X7=14)

a) What is the importance of References in a research paper? How will you present your findings differently from other authors findings?

b) How should you end the Discussion if you do have a Conclusions section in your research paper?

c) What are flat phrases? Why should be they avoided?

Q3. Attempt any two of the following (2X7=14)

a) How should one begin 'Methods' section in a research paper? Explain in detail with example?

b) Define Hedging. Why is it required in a research paper?

c) Elaborate the disadvantages of writing long paragraphs?

Q 4. Attempt any two of the following (2X7=14)

a) What are linking words? How can you reduce their number in a research paper?

b) Explain Redundancy versus Conciseness with an example?

c) Write a short note on the usage of 'a', 'an', 'the' in a research paper with examples.

Q 5. Attempt any two of the following (2X7=14)

a) What do you mean by Final Check in research paper writing? Explain in detail various points to be taken care of while final check?

b) Write a paragraph on "Your use of the Internet" summarizing one or more of the following points. The last few sentences should:

• Outline a general conclusion. • Suggest some implications. • Indicate lines of 'future work'.

c) *Choose between a direct statement (the first word in bold) and a hedged statement (the second), as appropriate.*

We calculated that the minimum amount of water supplied (1) ***was / appears to have been*** around 7,000 m 3 per day. On the basis of demographic estimates for that century, people (2) ***consumed / may have consumed*** from 25 to 50 l per day. Yet our calculations (3) ***show / would seem to show*** that, if thermal baths and fountains are not taken into account, approximately 280 liters per head could have been pumped into the town. This figure (4) ***is / would seem to be*** 30 l per day higher than the daily average consumption of a post-industrial European country such as Italy. The quantity of water that (5) ***flowed / might have fl owed*** along the aqueduct (6) ***was thus / thus appears to have been*** much greater than was needed by the population living in Gortyn, which has been estimated as being around 25,000. Therefore, the aqueduct (7) ***was built / was probably built*** not exclusively to provide drinking water for the citizens.

CENTRAL UNIVERSITY OF HARYANA

Term End Examination April 2022

Programme : M.Tech

Semester : First

Course Title : Advanced Solid Mechanics

Course Code : MT CE 101

Session: 2021-22

*Max. Time: **3 Hours***

*Max. Marks : **70***

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 has three parts and student need to answer any two parts of each question. Each part carries seven marks.

Question No. 1. **(4x3.5=14)**

a. Elaborate the concept of octahedral stress and derive the equation for octahedral normal stress and octahedral shearing stress.

b. What do you mean by volumetric strain? Determine it for rectangular parallelepiped with side's Δx, Δy, Δz undergoes deformation.

c. Define Castigliano's Theorem's. Also discuss the Generalisation of Castigliano theorem for non linear body.

d. Discuss Composite materials. Write the expression of Elastic Potential for composite materials.

e. The state of stress at a point is such that: $\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yz} = \tau_{zx} = P$. Determine the principal stresses and their directions.

f. Two point P and Q in the undeformed body have the coordinates **(0, 0, 1)** and **(2, 0, -1)** respectively. The displacement field for the body is given by:
$\mathbf{u} = (x^2+y)\mathbf{i} + (3+z)\mathbf{j} + (x^2+2y)\mathbf{k}$. What is the distance between point P and Q after deformation?

g. A thin walled cylindrical shell has a diameter of 1.2 m and wall thickness 12 mm. if the elastic limit for the shell material as determined by uniaxial tensile test is 270 N/mm^2, find the maximum internal pressure on basis of principal stress theory. Take factor of safety = 3.

Note: Question number **Two to Five** have three sub parts and students need to answer **any two sub part** of each question. Each sub part carries **seven marks.**

Question No. 2 **(2x7=14)**

a. At a point P the rectangular stress components are: $\sigma_x = 1$, $\sigma_y = -2$, $\sigma_z = 4$, $\tau_{xy} = 2$, $\tau_{yz} = -3$, $\tau_{zx} = 1$. All in units of kPa. Find the principal stress and check for invariance.

b. Represent the stress component on an arbitrary plane and derive the equation for Cauchy Stress formula.

c. Define hydrostatic and pure stress. The state of stress characterized by τ_{ij} is given below.

$$\sigma_x = 10, \sigma_y = 2, \sigma_z = 6, \tau_{xy} = 4, \tau_{yz} = 8, \tau_{zx} = 6$$

Resolve the given state into a hydrostatic state and pure shear state. Determine the normal and shearing stresses on an octahedral plane. Compare these with σ_{oct} and τ_{oct} calculated for the hydrostatic and pure shear states. Are the octahedral planes for the given state, the hydrostatic state and pure shear state the same or are they different? Explain why.

Question No. 3 **(2x7=14)**

a. The following displacement field is imposed on a body : $\mathbf{U} = (xyi+3x^2zj+4k)\ 10^{-2}$

Consider a point P and a neighbouring point Q where PQ has the following direction cosines, $n_x = 0.200$, $n_y = 0.800$. $n_z = 0.555$, the point P has coordinates **(2, 1, 3)**. If PQ = ΔS, find the component of P'Q' after deformation.

b. Discuss the Saint-Venant's equation of Compactibility in details.

c. If a point have coordinate (X, Y,Z) and nearby point Q have coordinate: **($X+U_x$, $Y+U_y$, $Z+U_z$)**, Where U_x, U_y and U_z are displacement component. How will you determine the change in length of the line element PQ caused by deformation

Question No. 4 **(2x7=14)**

a. Briefly discuss the yield criteria propounded by Tresca, Von Mises-Henky and the various parameters involved in their theories.

b. Discuss briefly the significance of various failure theories of materials and their suitability for application to elastic and brittle materials.

c. A cylindrical bar of 7cm diameter is subjected to a torque equal to 3400 Nm, and a bearing moment M. if the bar is at the point of failing in accordance with the maximum principal stress theory, determine the maximum bending moment it can support in addition to torque. The tensile elastic limit for the material is 207 MPa, and the factor of safety to be used is 3.

Question No. 5 **(2x7=14)**

a. Define Laminates. Write the expression for stress and strain components for unidirectional laminates.

b. A glass fiber reinforced nylon composite contains E-glass fiber 30% by volume. Calculate the percentage of load carried by the fibers when the composite is loaded. The moduli of elasticity of the constituents are E(glass) = 72 GPa, E (nylon) =2.8 GPa

c. Two carbon steel balls, each 25 mm in diameter are pressed together by a force F = 18N. At the centre of the area of contact, determine the values of the principal stresses, the maximum shear stress, and the octahedral shear stress. For carbon steel, Young Modulus of Elasticity (E) = 207 GPa, and Poisson's ratio (v)= 0.292.

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations March 2023

Programme: M. Tech. Structural Engineering **Session: 2022-23**

Semester: I (First) **Max. Time: 3 Hours**

Course Title: Smart Cities: Infrastructure, Planning and Management **Max. Marks: 70**

Course Code: MT CE 118

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. Write short notes on any four of the following: (4X3.5=14)

a) Life Cycle Analysis

b) Retrofitting

c) ICT

d) Special Purpose Vehicle

e) Urbanization

f) Features of Indian Smart City

g) Smart Microgrids

Q 2. Attempt any two of the following questions. (2X7=14)

a) Explain different elements of a waste management system. Further enlist data requirements for designing a waste management system for a smart city.

b) What are Smart Microgrids. Explain the benefits of smart microgrids over conventional centralized power supply system.

c) The future energy needs for a smart city shall be designed on a decentralized energy generation and distribution system. Explain.

Q3. Answer any two of the following (2X7=14)

(i) Discuss the pillars of strategy for developing a smart city under Indian Smart City Mission.

(ii) In the wake of rapidly growing urbanization highlight the challenges faced by growing cities.

(iii) Absence of a proper waste management system for a city could result in an environmental hazard. Justify the statement with the case of Love Canal.

Q 4. Attempt any two of the following questions. (2X7=14)

(a) Is developing smart cities a sustainable option to meet demands of rapidly growing urbanization? Discuss and justify.

(b) Enlist and briefly discuss the benefits of becoming a smart city.

(c) Discuss Indian Smart City Mission with focus on City Selection Procedure, Funds and financial framework and progress monitoring for selected cities.

Q 5. Answer any two of the following: (2X7=14)

a) Elaborate the role of ICT in development of a smart city. Further discuss smart solutions which could be offered by integration of ICT.

b) Discuss the road ahead in integrating the existing infrastructural and governmental framework with smart techniques to develop and transform the city into a smart city. Also highlight the possible challenges and gaps for the same.

c) Discuss the road ahead in integrating the existing infrastructural and governmental framework with smart techniques to develop and transform the city into a smart city. Also highlight the possible challenges and gaps for the same.

QUESTION PAPER

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations, April, 2022

Programme: M.Tech. (Structural Engineering) Session: 2021-22

Semester: Course work Max. Time: 3 Hours

Course Title: Condition Assessment and Retrofitting of Structures Max. Marks: 70

Course Code: MT-CE 103

Instruction: Question no. 1 is compulsory. Attempt one option from rest of each question.

Q-1. Attempt any four options: (3.5x4 = 14 marks)

I. Define active strengthening in structural members.
II. Define semi-destructive testing techniques.
III. Enlist the factors affecting selection of repair materials.
IV. Define column jacketing.
V. Define FRP wrapping.
VI. Enlist any four techniques of column strengthening.

Q-2 Define embedded metal corrosion in concrete and its disintegration mechanism with the help of diagram. Explain in detail the protective measures against the corrosion of bars in the RCC. (14 marks)

or

An-in-situ concrete structure is showing numerous rust strained cracks and in some case pieces of concrete have spalled exposing seriously corroded reinforcement. Explain in detail how will you identify and measure the cause of above mentioned deterioration? (14 marks)

Q: 3 What are the characteristics of a good substrate. How you plan for strategy and design of a surface preparation in the deteriorated reinforced concrete structural member. Also explain the significance of bonding repair materials. (14 marks)

or

Explain in detail the various methods of placement of concrete for surface repairs with the help of diagram. (14 marks)

Q-4. Explain in detail various methods of column strengthening with the help of diagrams. (14 marks)

or

Define bands. At what levels in a masonry building would you provide them? Give justifications for each of case in detail. Strong bricks and weak mortar are recommended for masonry buildings. Justify. (14 marks)

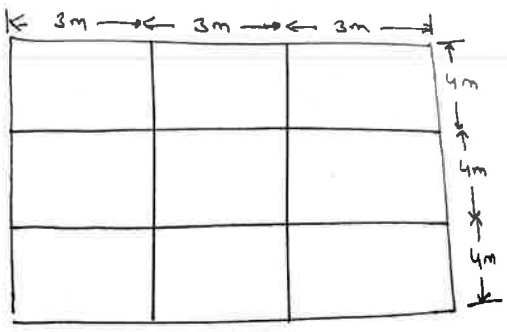
Q-5. What are the possible damages to RC buildings in earthquake-prone regions? What are the principles of earthquake-resistant design of RC buildings in accordance to relevant Indian Standard? Explain in detail the lessons learnt goals of earthquake resistant design. (14 marks)

or

A four storey building has been analyzed using response spectra method. Consider the following data:

Location of building – Delhi
Type of building –residential (OMRF)
Ht. of storey- 3 m
Size of column- 400x400 mm
Size of beam – 200x350mm
Slab thickness – 150 mm
Imposed load- 3kN/m2
Roof load-1.5 kN/m2

Calculate the base shear and floor loads for bare frame RC building. (14 marks)



CENTRAL UNIVERSITY OF HARYANA

Term End Examination April 2022

Programme : **M.Tech**

Semester : **1st**

Course Title : **Advanced Solid Mechanics**

Course Code : **MT CE 101**

Session: 2021-22

Max. Time: 3 Hours

Max. Marks : 70

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 has three parts and student need to answer any two parts of each question. Each part carries seven marks.

Question No. 1. **(4x3.5=14)**

a. Elaborate the concept of octahedral stress and derive the equation for octahedral normal stress and octahedral shearing stress.

b. What do you mean by volumetric strain? Determine it for rectangular parallelepiped with side's Δx, Δy, Δz undergoes deformation.

c. Define Castigliano's Theorem's. Also discuss the Generalisation of Castigliano theorem for non linear body.

d. Discuss Composite materials. Write the expression of Elastic Potential for composite materials.

e. The state of stress at a point is such that: $\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yz} = \tau_{zx} = P$. Determine the principal stresses and their directions.

f. Two point P and Q in the undeformed body have the coordinates **(0, 0, 1)** and **(2, 0, -1)** respectively. The displacement field for the body is given by: $\mathbf{u} = (x^2+y)\mathbf{i} + (3+z)\mathbf{j} + (x^2+2y)\mathbf{k}$. What is the distance between point P and Q after deformation?

g. A thin walled cylindrical shell has a diameter of 1.2 m and wall thickness 12 mm. if the elastic limit for the shell material as determined by uniaxial tensile test is 270 N/mm^2, find the maximum internal pressure on basis of principal stress theory. Take factor of safety = 3.

Note: Question number **Two to Five** have three sub parts and students need to answer **any two sub part** of each question. Each sub part carries **seven marks.**

Question No. 2 **(2x7=14)**

a. At a point P the rectangular stress components are: $\sigma_x = 1$, $\sigma_y = -2$, $\sigma_z = 4$, $\tau_{xy} = 2$, $\tau_{yz} = -3$, $\tau_{zx} = 1$. All in units of kPa. Find the principal stress and check for invariance.

b. Represent the stress component on an arbitrary plane and derive the equation for Cauchy Stress formula.

c. Define hydrostatic and pure stress. The state of stress characterized by τ_{ij} is given below.

$$\sigma_x = 10, \sigma_y = 2, \sigma_z = 6, \tau_{xy} = 4, \tau_{yz} = 8, \tau_{zx} = 6$$

Resolve the given state into a hydrostatic state and pure shear state. Determine the normal and shearing stresses on an octahedral plane. Compare these with σ_{oct} and τ_{oct} calculated for the hydrostatic and pure shear states. Are the octahedral planes for the given state, the hydrostatic state and pure shear state the same or are they different? Explain why.

Question No. 3 **(2x7=14)**

a. The following displacement field is imposed on a body : $\mathbf{U} = (xy\mathbf{i}+3x^2z\mathbf{j}+4\mathbf{k})\ 10^{-2}$

Consider a point P and a neighbouring point Q where PQ has the following direction cosines, $n_x = 0.200$, $n_y = 0.800$. $n_z = 0.555$, the point P has coordinates **(2, 1, 3)**. If PQ = ΔS, find the component of P'Q' after deformation.

b. Discuss the Saint-Venant's equation of Compactibility in details.

c. If a point have coordinate (X, Y,Z) and nearby point Q have coordinate: **($X+U_x$, $Y+U_y$, $Z+U_z$)**, Where U_x, U_y and U_z are displacement component. How will you determine the change in length of the line element PQ caused by deformation

Question No. 4 **(2x7=14)**

a. Briefly discuss the yield criteria propounded by Tresca, Von Mises-Henky and the various parameters involved in their theories.

b. Discuss briefly the significance of various failure theories of materials and their suitability for application to elastic and brittle materials.

c. A cylindrical bar of 7cm diameter is subjected to a torque equal to 3400 Nm, and a bearing moment M. if the bar is at the point of failing in accordance with the maximum principal stress theory, determine the maximum bending moment it can support in addition to torque. The tensile elastic limit for the material is 207 MPa, and the factor of safety to be used is 3.

Question No. 5 **(2x7=14)**

a. Define Laminates. Write the expression for stress and strain components for unidirectional laminates.

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CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Tech (Civil) Structural Engineering **Session: 2021-22**

Semester: 1st Sem **Max. Time: 3 Hours**

Course Title: Advanced reinforced Concrete Design **Max. Marks: 70**

Course Code: MTCE 102

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Explain the difference between long column and short column
b) What are additional secondary moments in slender columns? How do we include them in the design of braced and unbraced slender columns?
c) Write down the codal provision for providing reinforcement in a deep beam.
d) Explain the yield line theory of slabs. What are the properties of yield lines?
e) What are the methods available for yield line analysis of slabs?
f) What do you understand by the term limit state of Serviceability? Explain the terms "short term" and "long term" deflection of beam.
g) Explain the difference between bunker and silos using diagram.

Q 2. (2X7=14)

a) Design the reinforcement to be provided for short column 400 mm × 500 mm subjected to following forces. Use M25 concrete and Fe 415 steel.
   Pu =1600 kN
   Mux =200 kNm
   Muy =150 kNm
b) Determine the reinforcement required for a column with the given data and is restrained against sway.
   Size of the column = 500 mm × 400 mm
   Concrete Grade =M30
   fy =415 N/mm2
   lex = 7.0 m
   ley =6.0 m
   Unsupported length =7.0 m
   Factored load (Pu) = 1600 kN
   Factored moment is 40 kNm at the top, 25 kNm at bottom in the direction of larger dimension. Factored moment is 30 kNm at the top, 20 kNm at bottom in the direction of shorter dimension. The column is bend in double curvature with reinforcement equally distributed on all the four sides
c) Classify various types of reinforced concrete shear walls. Explain in brief with diagram
   i) Coupled Shear wall ii) Rigid Frames Shear walls

Q3. (2X7=14)

a) Design a simply supported deep beam to the following requirements. Use M20 Concrete and Fe 415 steel.

Clear span = 4.20 m
Bearing at each end = 450 mm
Overall depth =3500 mm
Width of beam =250 mm
Superimposed load = 225 kN/m

b) A simple supported deep beam is 350 mm wide, 4200 mm deep, has a clear span of 6 metre. The beam carries a superimposed load of 300 kN/m. The beam has a bearing of 450 mm at each end. Design the beam with M20 concrete and Fe415 steel.

c) What do you mean by the concept of Strut-Tie model? Elaborate its application in design of deep beams with diagram.

Q 4. (2X7=14)

a) Prove that the ultimate load carrying capacity of a circular slab of radius r is $6m_u/r^2$

b) Determine the permissible service load for a simply supported square slab of size 4 m × 4 m. It is reinforced with 10 mm diameter bars @ 200 mm c/c in both directions. The total depth of slab is 150 mm.

c) Design a simply supported square slab of 4m to support a service load of $4kN/m^2$. Use M20 concrete and Fe 415 Steel.

Q 5. (2X7=14)

a) Derive the equation of lateral force acting on a shallow Bins using W. Airy's Theory. A concrete bin is 3.5 m × 3.5 m and contains wheat weighing 8500 N/m3. The Coefficient of friction between grain and grain is 0.45. The Coefficient of friction between grain and concrete is 0.42. If the depth of wheat is 2.75 m, determine the lateral pressure per meter run of the bin wall.

b) A rectangular beam 300 mm × 500 mm is reinforced with 4-bars of 16 mm diameter at an effective depth of 470 mm. Two hanger bars of 12mm are provided on the compression face. If the beam is subjected to a service load of 15 kN/m, over a span of 5m then compute the short term and long term deflection of the beam. Use M20 concrete and Fe 415 steel.

c) A simple supported beam 500 mm × 700 mm subjected to a moment of 300 kNm, having a span of 6 m is reinforced with 5-25 mm diameter bar on the tension side, calculate the design surface crack width at the bottom of the tension face, if M20 concrete and Fe 415 Steel is used.

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Tech (Civil) Structural Engineering **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Advanced reinforced Concrete Design **Max. Marks: 70**

Course Code: MTCE 102

Instructions:

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Central University of Haryana
Odd Semester Term End Examination April 2022
M.Tech. Programme
Branch: STRUCTURAL ENGINEERING

Course Code: MT CE 118 **Max Time:** 03 Hrs
Course Title: Smart Cities: Infrastructure, Planning and Management **Max Marks:** 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2 (two) to 5 (five) carry fourteen marks each with internal choice.

PART - I

Q1. Write short notes on any four of the following: (4 X 3.5 = 14)

(a) Life Cycle Analysis
(b) Pan City Development
(c) Smart Microgrids
(d) Smart Urban Transportation Systems
(e) Features of Indian Smart City
(f) Integration of ICT into existing city framework has challenges. Discuss.
(g) Key elements of smart city.

PART - II

Q2. (a) Explain waste management hierarchy. Further discuss the concept of waste management system in context of a smart city. (2 X 7) = 14
(b) Enlist and discuss the benefits of transition to smart urban energy systems.
(c) Explain the importance of collaborating within the city for a smart city.

Q3. (a) Rapid Urbanisation presses the need for transforming the existing urban cities to smart cities. Explain the above statement in context of issues pertaining to urbanisation. (2 X 7) = 14
(b) Development of smart cities is an opportunity for economic development and increases digital equity. Explain.
(c) What is a Special Purpose Vehicle? Explain its role in smart city development.

Q4. (a) With the help of suitable examples explain the benefits of ITS in improving the transportation system of a city. (2 X 7) = 14 Marks

(b) Discuss how ICT could play a significant role in construction industry.

(c) Discuss global and national initiatives in context of smart cities with examples from smart cities at global levels.

Q5. 14 Marks

(a) Discuss Indian Smart City Mission with focus on City Selection Procedure, Funds and financial framework and progress monitoring for selected cities.

(b) Elaborate the role of ICT in development of a smart city. Further discuss smart solutions which could be offered by integration of ICT.

(c) Explain the need and challenges for transportation of an Urban city to a smart city.